

## ANSWERS: Explain Entropy change

1) Available in April 2015

2) Enthalpy change: The combustion of liquid hydrazine is an exothermic process since  $\Delta_c H^\circ$  is negative. Exothermic reactions form products that have lower energy than the reactants / energy is released and this favours the spontaneous / forward reaction.

Entropy change: Exothermic reactions release heat to the surroundings, which makes the entropy change of the surroundings positive. As both the surroundings and the system gain entropy, this favours the spontaneous / forward reaction.

OR

The combustion reaction has more gas molecules in the products / goes from liquid to gas / increase in number of particles. Therefore the entropy of the system increases and this favours the spontaneous / forward reaction.

As both enthalpy and entropy are favoured, then hydrazine readily burns / the reaction is spontaneous.

3) The entropy change in a spontaneous reaction is positive. However, the entropy change of the steam when it condenses is negative as gases have higher entropy than liquids.

When steam condenses, energy is given out to its surroundings. This increases the entropy of the surroundings. Hence the total entropy change (entropy change of the steam and entropy change of the surroundings) is positive as this is a spontaneous reaction.